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**(54) APPARATUS FOR GENERATING A USAGE DATA-SIGNAL IN A METER**

**(Abstract)**

Disclosed is an apparatus for generating a usage data-signal in a meter. The apparatus comprises a light barrier for blocking an external light inflowing into a lower-digit numberplate lower than a metering unit; a reflective surface installed in a certain number place of the lower-digit numberplate; a photodiode disposed above the lower-digit numberplate and separated by a partition; a phototransistor for sensing the light from the photodiode reflected by the reflective surface and for generating an electrical signal; and a counter for counting the frequency of generations for the electrical signal generated by the phototransistor. The frequency that the lower-digit numberplate less than the reading unit occurs is counted and a usage data signal is generated. The usage data signal generator of the invention has an advantage in that it can generate the usage data signal, without replacing the already-installed meter.

Representative Drawing

FIG 1

**(Specification)**

(Brief Description of the Drawings)

FIG. 1 shows the construction of an apparatus for generating a usage data-signal in a meter, in which a photodiode and a phototransistor are installed in the lowest-digit numberplate in the meter according to the invention.

## &lt;Description of Major Components in the Drawings&gt;

10: Light barrier                      11: Reflective surface

12: Partition                              13: Photodiode

14: Phototransistor

(Detailed Description of the Invention)

(Object of the Invention)

(Field and Background of the Invention)

5 The present invention relates to an apparatus for generating a usage data-signal using light-sensing, in which it can be applied to an already-established meter.

A usage data-signal of a meter is needed for remotely reading the meter. In the remote-reading system of a meter, a data-signal is generated according to the amount of consumption thereof and transmitted to the provider through a wire or wireless communication line.

10 Conventionally, in order to read the utility meter such as electricity, gas, water or the like, a meterman visits each customer's house and directly reads the meter. Lots of time and efforts are needed to charge the use fee, for example, in absence of a customer, the meterman must visit the house repeatedly, and the like.

In addition, an error is prone to be made during the course of reading and recording each customer's meter by a meterman, and inputting by the provider.

15 In order to solve the above problems and remotely read a meter, the meter must be able to generate a data-signal indicating the amount of used supplies or utility. Conventionally, however, it has not been known a remote-reading system of a meter, let alone a usage data-signal generator.

20 On the other hand, it is preferred that a data-signal generator of a meter can be easily applied to and installed in the established meter, without replacing the whole meter, which leads to a significant increase in the cost of a remote-reading system.

(Object of the Invention)

25 It is an object of the invention to provide an apparatus for generating a usage data-signal, in which it can be applied to a remote-reading system of a meter and generate a usage data-signal indicating an amount of consumption without replacing the already-installed meter.

(Construction and Operation of the Invention)

30 In order to accomplish the above object of the invention, according to the invention, there is provided an apparatus for generating a usage data-signal in a meter. The apparatus of the invention comprises: a light barrier for blocking an external light inflowing into a lower-digit numberplate lower than a metering unit; a reflective surface installed in a certain number place of the lower-digit numberplate; a photodiode disposed above the lower-digit numberplate and separated by a partition; a phototransistor for sensing the light from the photodiode reflected by the reflective surface and generating an electrical signal; and a counter for counting the frequency of generations for the electrical signal generated by the phototransistor.

The preferred embodiment of the invention will be hereafter described with reference to the accompanying drawing.

40 FIG. 1 schematically illustrates a signal generator for reading an amount of consumption in a meter according to the invention, in which a photodiode and a phototransistor are disposed on a lower-digit numberplate in the metering device.

45 The number plates of the meter is comprised of 'significant numberplates', which is read and used for calculating the amount of consumption, and 'trivial numberplates', which is in a lower-digit level and used simply for metering and displaying the amount of consumption of supplies. For example, in case of electricity, the electricity consumption is charged in a unit of kW by the electricity provider, but the watt-hour meter has a numberplate of 0.1kW unit, the

number of which continually goes up as the customer uses the electricity. If the numberplate of 0.1 kW unit reaches the number 9, then the kW unit plate is increased by one (kW). These trivial numberplates below the significant ones may be plural, for example, numberplates of 0.1kW and 0.01kW in case of a watt-hour meter for electricity.

5 According to the invention, the rotation of the trivial numberplate is sensed and a signal indicating the consumption of supplies is generated. The signal generator of the invention for indicating a consumption in a metering device comprises a light barrier 10 for blocking the external light into the trivial numberplates (below the reading unit), a reflective surface 11 disposed in a certain selected one of the trivial numberplates, a photodiode 13 and a  
10 phototransistor 14 above the trivial numberplates and separated by a partition 12 installed in the light barrier 10. According to the invention, the selected numberplate may be a lowermost-digit one among the trivial numberplates.

In the usage data-signal generator having the above construction, basically, when the light radiated by the photodiode 13 is reflected by the reflective surface 11 placed on the lower-  
15 digit numberplate, the phototransistor 14 senses the reflected light and generates an electrical signal. The light barrier 10 blocks the external light inflowing from outside. Therefore, the lower-digit numberplate can be read from the outside of the meter, but as described above, the lower-digit numberplate is not very important for metering the amount of consumption.

20 The operation of a usage data signal generator according to the invention will be explained below.

First, as the amount of supplies consumed is accumulated, the lower-digit numberplate is driven to thereby increase sequentially the number thereof. While doing that, the light from the photodiode 13 is reflected on the reflective surface 11 and sensed by the phototransistor 14, which in turn generates an electrical signal. More specifically, for example, if the reflective  
25 surface is disposed in the number '0' of the lower-digit numberplate, the light from the photodiode 13 will be reflected on the number '0' during every rotation thereof as the consumption continues, and simultaneously the phototransistor will sense the reflected light and generate a corresponding signal. The number of the signal generation can be counted and converted into the corresponding amount of supplied utility. For example, in case of electricity  
30 meter having a lowest-digit platenumber of 0.1 kW unit, whenever the number '0' occurs in the lowest-digit numberplate, the number of the kW unit will be increased by one. Therefore, the number of signal generations by the phototransistor may be counted and used to read the amount of consumption.

35 The usage data signal generator of a meter according to the invention can be simply combined with the existing meter by modifying the cover above the numberplate thereof. That is, since the cover above the numberplate of the conventional meter is flat, the light barrier, the partition, the photodiode, and the phototransistor can be attached thereto without difficulties. The existing cover above the lowest numberplate may be replaced with a cover having a photodiode and a phototransistor.

#### 40 (Effects of the Invention)

As described above, in the usage data signal generator of a meter, the frequency that the lower-digit numberplate less than the reading unit occurs is counted and a usage data signal is generated. The usage data signal generator of the invention has an advantage in that it can  
45 generate the usage data signal, without replacing the already-installed meter.

**(57) Claims:**

1. An apparatus for generating a usage data signal in a meter, the apparatus comprising:  
a light barrier for blocking an external light inflowing into a lower-digit numberplate  
lower than a metering unit;  
5 a reflective surface installed in a certain number place of the lower-digit numberplate;  
a photodiode disposed above the lower-digit numberplate and separated by a partition;  
a phototransistor for sensing the light from the photodiode reflected by the reflective  
surface and generating an electrical signal; and  
10 a counter for counting the frequency of generations for the electrical signal generated by  
the phototransistor.

2. An apparatus according to claim 2, wherein the lower-digit numberplate less than a  
metering unit includes a lowest-digit numberplate.